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# *Spinotrachelas*, a new genus of tracheline sac spiders from South Africa (Araneae: Corinnidae)

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## ABSTRACT

The new tracheline spider genus *Spinotrachelas* gen. n. (Araneae: Corinnidae) is described. This genus is characterised by the presence of pairs of strong spines on the tibiae of the two anterior pairs of legs in both sexes, strong cusps on the metatarsi and tarsi of males, and tarsal cusps on leg I of females. The genus is presently only known from a single species, *S. capensis* sp. n., which is endemic to Western Cape Province in South Africa. A discussion on the relationships of tracheline genera is provided, together with a review of the morphological characteristics of the subfamily.

KEY WORDS: Araneae, Corinnidae, Trachelinae, *Spinotrachelas*, new genus, ant-mimicry, Afrotropical.

## INTRODUCTION

The spider family Corinnidae remains one of the more poorly studied groups in the Afrotropical region. Only two generic revisions, of the genera *Graptartia* Simon, 1896 and *Thysanina* Simon, 1910, have been published so far (Haddad 2004; Lyle & Haddad 2006), although the genus *Hortipes* Bosselaers & Ledoux, 1998 has also been well studied (Bosselaers & Ledoux 1998; Ledoux & Emerit 1998; Bosselaers & Jocqué 2000*a*). As part of a drive to improve knowledge of the diversity of this family, revisions of several genera in the subfamilies Castianeirinae, Corinninae and Trachelinae are under way.

Tracheline sac spiders are generally recognised by the complete absence of leg spines and the presence of ventral leg cusps, in males at least, on the last three segments of the anterior legs (Platnick & Shadab 1974*a*). The subfamily Trachelinae is now represented in the region by seven genera: *Austrachelas* Lawrence, 1938, *Brachyphaea* Simon, 1895, *Cetonana* Strand, 1929, *Paccius* Simon, 1898, *Pronophaea* Simon, 1897, *Thysanina* Simon, 1910 and *Trachelas* L. Koch, 1866 (Dippenaar-Schoeman & Jocqué 1997; Bosselaers & Jocqué 2000*b*; Platnick 2000). The monotypic genus *Lessertina* Lawrence, 1942, currently listed as Corinnidae *incertae sedis*, may also belong in the Trachelinae (Bosselaers & Jocqué 2000*b*, 2002), but may possibly belong instead in the Miturgidae: Eutichurinae (M. Ramirez, pers. comm.). The placement of this unusual genus may ultimately be determined by an author's interpretation of the especially short leg spines on male tibiae I, which may or may not be leg cusps. In contrast, the genera *Brachyphaea* and *Pronophaea* have strong paired ventral leg spines, lack cusps and have more cheliceral teeth than typical trachelines, and should be transferred to the Corinninae.

The tracheline fauna of several geographical regions has been well studied, including revisions of the south-east Asian fauna (Deeleman-Reinhold 2001) and several American genera (Platnick & Shadab 1974*a*, *b*; Platnick 1975; Platnick & Ewing 1995). However, only one of the Afrotropical genera, the monotypic genus *Thysanina*, has been subject to revision (Lyle & Haddad 2006), following the transfer of the genus from the

Liocranidae to the Corinnidae by Bosselaers and Jocqué (2000*b*). Lyle and Haddad (2006) redescribed the type species, *T. serica* Simon, 1910, and described five new species. Similarly, Platnick (2001) described five new species of *Paccius* from a single reserve in Madagascar, reflecting the currently poor knowledge of this subfamily in the region.

In the present paper, the first in a series on the Trachelinae fauna of the Afrotropical region, a new genus of tracheline spiders is described from South Africa. From specimens presently available, this genus appears to be endemic to Western Cape Province. Many of the specimens were found in association with ants of the genus *Crematogaster* Lund, 1831 (Hymenoptera: Formicidae), which these spiders resemble superficially and may possibly mimic.

## MATERIALS AND METHODS

All preparations and observations were done in 70% ethanol. Specimens were observed for description using a stereo microscope. The epigyne of the paratype female was dissected with 0-size insect pins, cleared for 8 minutes in a Branson 3200 ultrasonic bath, and drawn. A left palp of a male paratype was dissected and drawn.

All measurements are given in millimetres (mm). Body measurements were determined for the smallest and largest males amongst the material examined to provide a size range, and also for the single female paratype. Eye and leg measurements are given for the largest specimen of each sex. Leg spination follows Bosselaers and Jocqué (2000*a*, *b*).

The following abbreviations are used in the text:

| | | | |
|---|---|---|---|
| AER | anterior eye row | PER | posterior eye row |
| AL | abdomen length | *pl* | prolateral |
| ALE | anterior lateral eye | PLE | posterior lateral eye |
| AME | anterior median eye | *plv* | prolateral ventral |
| AW | abdomen width | PME | posterior median eye |
| CL | carapace length | *rlv* | retrolateral ventral |
| CW | carapace width | SL | sternum length |
| *do* | dorsal | SW | sternum width |
| FL | fovea length | TL | total length |

Material for scanning electron microscopy was dehydrated in a graded ethanol series and then critical-point dried in an argon chamber. Specimens were mounted on stubs, sputter-coated three times with gold, and then studied in a JEOL WinSEM at 10 kV. Digitised micrographs were taken.

Holotype and paratype label data are quoted as they appear. A slash (/) indicates the end of a line of print, and two slashes (//) signify data on a further label. Locality coordinates are provided when available.

Material used in this study is deposited in the following collections (curators are named in parentheses):

| | |
|---|---|
| NCA | National Collection of Arachnida, ARC–PPRI, Pretoria, South Africa (A. Dippenaar-Schoeman). |
| NMBA | National Museum, Bloemfontein, South Africa (L. Lotz). |
| SAMC | South African Museum, Cape Town, South Africa (M. Cochrane). |

## TAXONOMY

### **Spinotrachelas** gen. n.

Etymology: This genus takes its name from the spiny legs and its superficial resemblance to the genus *Trachelas*. Gender masculine.

Type species: *Spinotrachelas capensis* sp. n.

Diagnosis: *Spinotrachelas* superficially resembles *Trachelas* and the Asian genus *Utivarachna* Kishida, 1940 in its general appearance (Fig. 1), but can be distinguished from all tracheline genera by the presence of strong prolateral spines on the femora and patellae and paired spines on the tibiae of the first pairs of legs of both males and females, in addition to metatarsal and tarsal cusps (Figs 2–7). These leg spines are evident in all instars. Males have a large number of short, peg-like cusps on the metatarsi and tarsi of legs I and II, while the females lack cusps on all leg segments except the tarsi of leg I. *Spinotrachelas* are black in colour and have pale yellow bands on the legs. The abdominal scutum covers the entire abdominal dorsum in males, but is absent in females.

Description: Small spiders, <5mm in size, black in colour; AER procurved, AME < ALE; AME closer to ALE than to each other; PER strongly recurved, PME > PLE; PME closer to each other than to PLE; carapace broadly oval, slightly narrowed laterally behind eye region, straight posteriorly; widest at midpoint; legs I and II longer and more strongly built than legs III and IV; legs with bands on tibiae; legs I and II with long spines prolaterally on femora and patellae, and paired ventrolateral spines on the tibiae; metatarsi and tarsi of males with two rows of strongly developed, peg-like cusps, present only on tarsus I of females; leg formula 1243; abdomen oval, tapering posteriorly, black with median paired transverse yellow markings (Fig. 1); male with complete dorsal scutum, absent in females; inframamillary sclerite absent.

### **Spinotrachelas capensis** sp. n.

Figs 1–18

Etymology: The species is named for Western Cape Province, where it is endemic.

Diagnosis: See genus diagnosis.

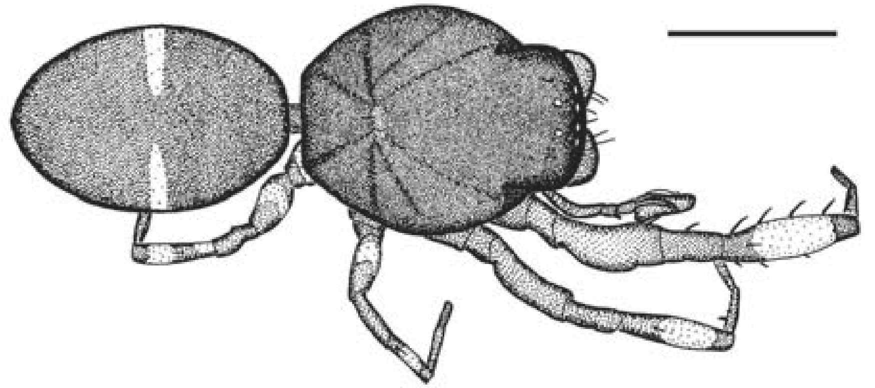
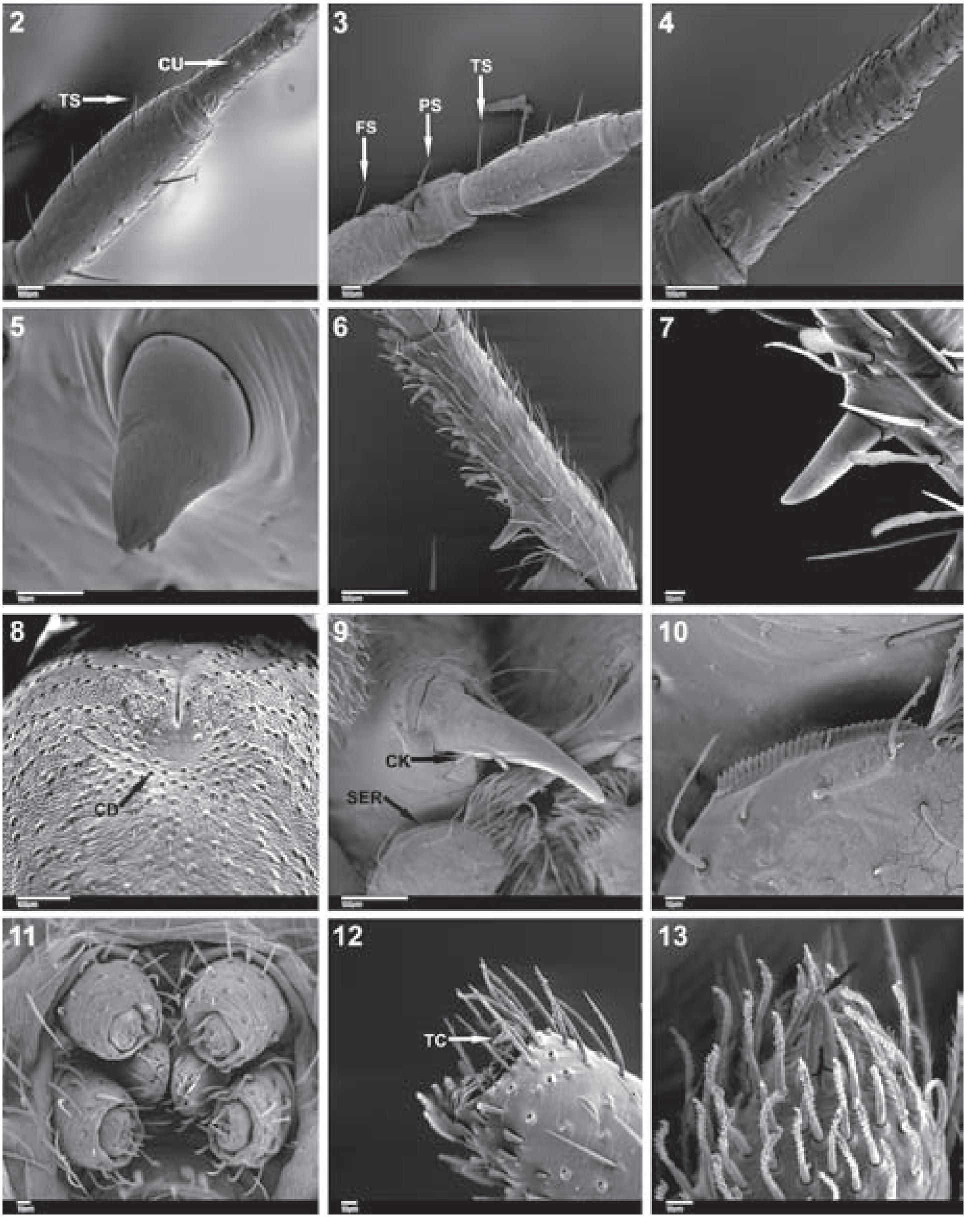


Fig. 1. General habitus of male *Spinotrachelas capensis* sp. n. Scale bar = 1 mm.



Figs 2–13. *Spinotrachelas capensis* sp. n., male: (2) leg I, indicating the presence of tibial spines (TS), and cusps (CU) on metatarsi; (3) leg I, indicating prolateral femoral spine (FS), prolateral patellar spine (PS) and paired tibial spines (TS); (4) metatarsus I, cusp arrangement, ventral view; (5) proximal cusp, enlarged; (6) metatarsus II, lateral view; (7) proximal cusp, enlarged; (8) dorsal view of carapace, showing carapace depression (CD); (9) mouthparts, showing cheliceral keel (CK) and serrula (SER) on endites; (10) serrula, enlarged; (11) spinnerets; (12) distal end of tarsus II, indicating tarsal claws (TC); (13) dorsal view of cymbium, indicating modified distal pair of setae.

Description:

*Male*.

Measurements: CL 1.70–1.97, CW 1.35–1.55, FL 0.12–0.15, AL 1.85–1.97, AW 1.21–1.40, TL 3.28–3.80, SL 0.87–0.92, SW 0.72–0.75. Interdistances between eyes: AME–AME 0.07, AME–ALE 0.02, ALE–ALE 0.27, PME–PME 0.13, PME–PLE 0.19, PLE–PLE 0.57.

Length of leg segments (sequence from femur to tarsus, and total): I 1.24+0.62+1.13+0.71+0.59=4.29; II 1.12+0.56+0.91+0.70+0.55=3.84; III 0.76+0.45+0.53+0.60+0.35=2.69; IV 0.78+0.49+0.75+0.80+0.33=3.15.

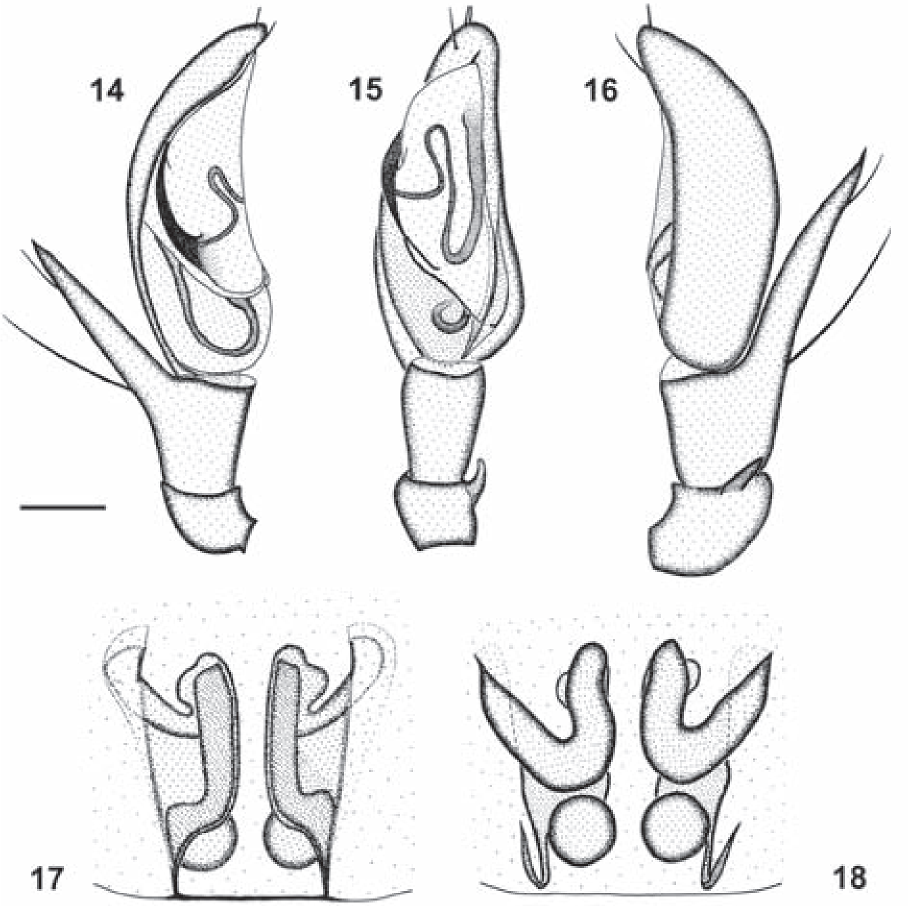
General appearance as in Fig. 1. Carapace convex, low in eye region, highest at half its length, slanting downwards sharply in its posterior third; surface finely wrinkled, with small protuberances at setal bases (Fig. 8); covered in scattered short, straight white setae; shallow transverse depression anterior to fovea (Fig. 8), just posterior to half carapace length; fovea long and fine; carapace uniform dark brown with black mottling; black striae radiating from fovea; ocular region dark brown. All eyes with black rings, except on retrolateral margin; AER strongly procurved, laterals slightly larger than medians; clypeus height equal to ALE diameter; AME separated by their diameter; AME separated from ALE by half AME diameter; PER strongly recurved, medians slightly larger than laterals; PME separated by slightly more than their diameter; PME separated from PLE by two times PLE diameter (Fig. 1). Chelicerae red-brown, with short black setae on anterior surface; three evenly spaced teeth on promargin, median tooth largest, distal tooth smallest; two teeth on retromargin, close together and subequal in size; small cheliceral keel present (Fig. 9); endites orange, rounded on anterior margin with well developed serrula (Figs 9, 10), straight on retrolateral and posterior margins; prolateral longitudinal ridge extending length of endites; labium brown, slightly wider than long. Abdomen oval-elongate, with dorsal scutum covering entire dorsum; dorsum very dark brown, nearly black, with lateral white or cream markings at half abdomen length; dorsum covered with short, straight white setae; epigastric area sclerotised, inframamillary sclerite absent. Spinnerets small, in compact group (Fig. 11); ALS largest, with one distinctive anterior ampullate gland spigot and several small, stout piriform gland spigots; PMS smallest, with three large cylindrical gland spigots and several small piriform gland spigots; PLS with three large cylindrical gland spigots and several small aciniform gland spigots. Legs I and II strongly built and long, legs III and IV weakly built and shorter; tarsal claws small (Fig. 12); coxae I dark brown, II–IV yellow; trochanters dark brown; femora I dark brown, II dark brown, yellow in proximal third, III and IV yellow proximally and dark brown distally; patellae dark brown; tibiae I and II dark brown with large median yellow band, III and IV dark brown with narrow proximal and broad median yellow band; metatarsi and tarsi I and II uniform orange brown, III and IV brown, slightly paler medially; leg spination: femora: I *pl* 1; patellae: I *pl* 1; tibiae: I *do* 1 *pl* 1 *plv* 3 *rlv* 3–4, II *do* 1 *rlv* 3, III *do* 1, IV *do* 1; metatarsi: I 4–5 *plv* cusps, 4 *rlv* cusps, II 4–7 *plv* cusps, 1 *rlv* cusp; tarsi: I 7 *plv* cusps, 7–8 *rlv* cusps, II 4–5 *plv* cusps, 3–4 *rlv* cusps. Palpal patellae with small retrolateral apophysis; palpal tibiae with long, curved sword-like dorsolateral apophysis; single long seta dorsally on apophysis; cymbium with pair of short stout black setae distally (Fig. 13); tegulum elongate-oval, with looping internal ducts; embolus long, wirelike, originating prolaterally, medially on tegulum; partly hidden beneath tegulum, emerging for short distance distally (Figs 14–16).

*Female*.

Measurements: CL 1.60, CW 1.28, FL 0.10, AL 2.37, AW 1.61, TL 3.95, SL 0.87, SW 0.62, AME–AME 0.05, AME–ALE 0.02, ALE–ALE 0.22, PME–PME 0.10, PME–PLE 0.14, PLE–PLE 0.48.

Length of leg segments (sequence from femur to tarsus, and total): I 0.99+0.47+0.79+0.60+0.52=3.37; II 0.93+0.44+0.73+0.54+0.43=3.07; III 0.67+0.39+0.47+0.53+0.28=2.34; IV 0.81+0.45+0.72+0.69+0.38=3.05.

General appearance, colouration and cheliceral dentition as for male; female abdomen larger and more oval than that of male; dorsal scutum and inframamillary sclerites absent; legs as for male, but less robustly built; leg spination: femora: I *pl* 1; patellae: *pl* 1; tibiae: I *do* 1 *pl* 1 *plv* 3 *rlv* 3, II *do* 1 *plv* 3, III *do* 1, IV *do* 1; metatarsi: without any



Figs 14–18. *Spinotrachelas capensis* sp. n., genitalia: (14–16) male, left palp: (14) prolateral view, (15) ventral view, (16) retrolateral view; (17–18) female: (17) epigyne, ventral view, (18) vulva, dorsal view. Scale bar = 0.1 mm.

spines or cusps; tarsi: I 2–3 distal *plv* cusps. Copulatory openings anterolaterally in epigyne (Fig. 17); entrance ducts curving posteromedially before entering spermathecae (Fig. 18); spermathecae narrow and elongate, with small, globose posteromedially situated terminal receptacles.

Holotype: ♂ 'R.S.A., Western Cape Province / De Hoop Nature Reserve, Potberg / 34°22.549'S, 20°32.004'E / 24.iii.2005, C. Haddad / under *Eucalyptus* bark // Corinnidae / Trachelinae / *Spinotrachelas capensis* / HOLOTYPE' (NCA 2005/2011).

Paratypes: 6♂ 1♀ 'R.S.A., Western Cape Province / De Hoop Nature Reserve / Bitou number 2 / 34°27.194'S, 20°24.250'E / 16.vii.2005, C. Haddad & R. Lyle / milkwood leaf litter, with ants // Corinnidae / Trachelinae / *Spinotrachelas capensis* / PARATYPES' (SAMC 005361).

Other material examined: SOUTH AFRICA: *Western Cape Province*: 1♀ 1 subadult, Clanwilliam, Lambert's Bay, 32°06'S:18°18'E, 21.x.1987, E. Visagie, on ground under plants (NMBA 02008); 1♂ De Hoop Nature Reserve, De Hoop Vlei, i.1992, N. Larsen (SAMC 002425).

Distribution: Endemic to Western Cape Province, South Africa (Fig. 19).

Natural history: This species was collected primarily from leaf litter in fynbos habitats. During July 2005, the adult paratypes and more than 10 immatures were collected from milkwood leaf litter. These specimens were found in association with cocktail ants of the genus *Crematogaster* Lund, 1831 (Hymenoptera: Formicidae), which they apparently mimic. Modifications include pale bands on the legs, a pair of white or cream markings on the abdomen, and the shiny dorsal scutum in males. No behavioural modifications were observed to suggest mimicry, and therefore, mimicry is suspected to be entirely morphological in origin.

## DISCUSSION

Tracheline corinnids are a group of small to medium-sized spiders that are distributed throughout the world, with diversity highest in the tropical regions. Most species belonging in this group can be recognised quite easily, primarily by their robust build,

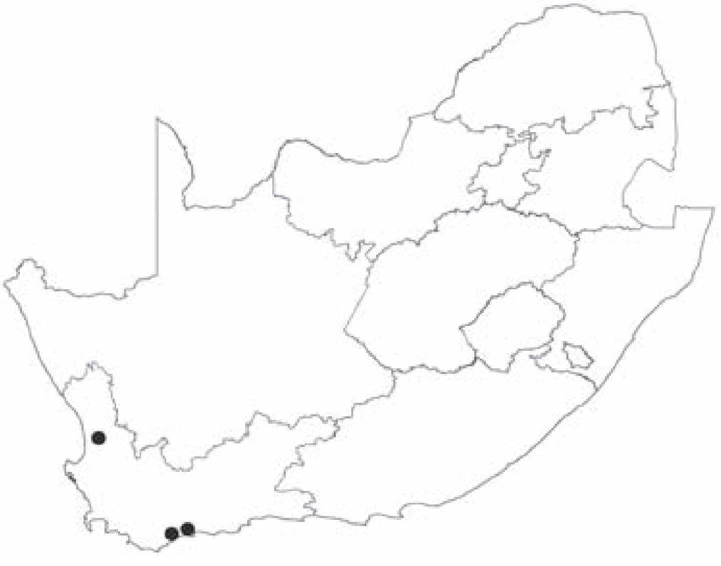


Fig. 19. Distribution of *Spinotrachelas capensis* sp. n.

strongly built anterior legs, strongly sclerotised carapace, and by the presence of leg cusps ventrally on the anterior legs, at least in males.

As early as Simon's (1897) monumental work on the Clubionidae, these characters have been used to define the group. Simon stated that [translated] 'the spines of the anterior tibias and metatarsi are often replaced either by small spinules or by lateral bands of spiniform setae'. According to Platnick and Shadab (1974*a*), trachelines can be characterised by the complete absence of leg spines and the presence, at least in males, of ventral cusps on the last three segments of the anterior legs. Subsequently, Platnick (1975) defined the group by the total absence of leg spines, heavily sclerotised cephalothorax and relatively simple genitalia.

However, exceptions to these diagnoses are quite common. For example, Afrotropical *Cetonana* species have prolateral leg spines present on the anterior femora, in addition to ventral leg cusps on the distal three segments of legs I and II. Variation may also be observed within a single genus, for example, the American genus *Meriola* Banks, 1895, where a few species have femoral spines in addition to cusps on legs I and II of males, while most species in this genus lack leg spines (Platnick & Ewing 1995). In contrast, spiders of a second new genus of Afrotropical trachelines, to be described by the author, superficially resemble *Trachelas*, but are more robustly built and have a total lack of leg spines and cusps, even in males. Platnick (1975) mentioned having seen trachelines from South America that lack cusps and leg spines, and proposed that cusps have gradually been lost in some tracheline lineages. This would suggest that a loss of cusps represents an apomorphic characteristic within the group, a view that I support.

The new genus *Spinotrachelas* resembles *Trachelas* in general morphology. However, *Trachelas* species lack any leg spines and have a different cusp structure, with very short, stout cusps (Platnick & Shadab 1974*a*, fig. 43), compared to the slightly more elongate cusps of *Spinotrachelas* (Fig. 7). *Spinotrachelas* has distinctive robust cusps on the metatarsi and tarsi of legs I and II of males, and females have a few cusps on tarsus I. Additionally, this genus is distinct amongst trachelines by the presence of 3 or 4 pairs of spines and no cusps on the tibiae I and II of both sexes. *Spinotrachelas* males have a very large, strongly sclerotised dorsal scutum, which is greatly reduced or absent in most other tracheline genera. Therefore, this genus has very distinctive morphological characteristics separating it from other tracheline genera. Since only a single species is known, it is difficult to propose any variation or similarity in these structures within the genus.

In conclusion, the loss of leg spines and cusps in the Trachelinae appears to be an apomorphic state found in a few genera only. Most genera have leg cusps, in males at least. *Spinotrachelas* has well developed cusps and perhaps the most complete spination of all presently known world tracheline genera. Therefore, it is possible that *Spinotrachelas* represents the most basal genus in the subfamily. This can be confirmed only when a thorough cladistic analysis, which should follow thorough revisions of the world fauna, is performed on the subfamily. The presence of cusps and general absence of leg spines indicates a predominant morphological trend within the group, and should be used as a guideline for the recognition of trachelines. Within genera (except *Trachelas*) there appears to be relative stability in the prevalence of these structures, which supports their monophyly, although the size and shape of these structures may be variable. The variability found in *Trachelas* may be a key factor in determining whether this genus is polyphyletic or not, although both a revision of the Afrotropical fauna, and a cladistic analysis incorporating the various species groups distributed worldwide, are needed to determine this. Further revisionary studies on the Afrotropical tracheline fauna will provide clarity on morphological variation within genera, and better define generic limits, characteristics and diversity.

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